

CLAIMS

1. A method of enabling user interaction with computer software running in a computer system via:

5 an interface surface containing information relating to the computer software and including coded data indicative of an identity of the interface surface and of at least one reference point of the interface surface; and

10 a sensing device which, when placed in an operative position relative to the interface surface, uses at least some of the coded data to sense indicating data indicative of: the identity of the interface surface; and a position of the sensing device relative to the interface surface;

the method including the steps of, in the computer system:

- (a) receiving the indicating data from the sensing device;
- (b) using the indicating data to identify at least one interactive element relating to
15 the computer software; and
- (c) operating the computer software in accordance with instructions associated with the at least one interactive element.

2. A method according to claim 1, wherein the interactive element is associated
20 with a zone of the interface surface, and step (b) includes using the position of the sensing device to identify the zone and thereby the interactive element.

3. A method according to claim 2, wherein the sensing device generates movement data indicative of its movement relative to the interface surface, using at least
25 some of the coded data, the method including the step of:

receiving, in the computer system, the movement data;

wherein step (b) includes using the movement data to identify the zone and thereby the interactive element.

4. A method of enabling user interaction with computer software running in a computer system, the method including the steps of:

providing an interface surface containing: information relating to the computer software; and coded data indicative of an identity of the interface surface and of at least one reference point of the interface surface; and

in the computer system:

- (a) receiving indicating data from a sensing device, the indicating data being indicative of: the identity of the interface surface; and a position of the sensing device relative to the interface surface, the indicative data being sensed when the sensing device is placed in an operative position relative to the interface surface, using at least some of the coded data;
- (b) using the indicating data to identify at least one interactive element relating to the computer software; and
- (c) operating the computer software in accordance with instructions associated with the at least one interactive element.

5. A method according to claim 4, wherein the interactive element is associated with a zone of the interface surface, and step (b) includes using the position of the sensing device to identify the zone and thereby the interactive element.

6. A method according to claim 5, wherein the sensing device generates movement data indicative of its movement relative to the interface surface, using at least some of the coded data, the method including the step of:

receiving, in the computer system, the movement data;

wherein the step of identifying the at least one interactive element includes using the movement data to identify the zone and thereby the interactive element.

7. A method according to claim 1 or 4, wherein the interactive element is a hyperlink element relating to the computer software, the method including the step of effecting, in the computer system, an operation associated with the hyperlink element.
- 5 8. A method according to claim 7, including the step of sending, in the computer system, data to the computer software indicative of the hyperlink element.
9. A method according to claim 8, including the step of sending, in the computer system, data to the computer software indicative of a name and/or value of at least one
- 10 field related to the computer software.
10. A method according to claim 7, including the step of sending, in the computer system, data to the computer software indicative of a selected object.
- 15 11. A method according to claim 1 or 4, wherein the interactive element is a checkbox field relating to the computer software, the method including the steps of identifying, in the computer system, that the user has entered a hand-drawn mark by means of the sensing device and effecting, in the computer system, an operation associated with the checkbox field.
- 20 12. A method according to claim 11, including the step of associating, in the computer system, a true value with the checkbox field.
13. A method according to claim 11, including the step of sending, in the computer
- 25 system, data to the computer software indicative of at least the checkbox field.
14. A method according to claim 1 or 4, wherein the interactive element is a text field relating to the computer software, the method including the steps of identifying, in

the computer system, that the user has entered handwritten text data by means of the sensing device and effecting, in the computer system, an operation associated with the text field.

5 15. A method according to claim 14, including the step of converting, in the computer system, the handwritten text data to computer text.

16. A method according to claim 15, including the step of associating, in the computer system, the computer text with the text field.

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17. A method according to claim 14, including the step of sending, in the computer system, data to the computer software indicative of at least the text field.

18. A method according to claim 1 or 4, wherein the interactive element is a
15 signature field relating to the computer software, the method including the steps of identifying, in the computer system, that the user has entered a handwritten signature by means of the sensing device and effecting, in the computer system, an operation associated with the signature field.

20 19. A method according to claim 18, including the step of verifying, in the computer system, that the signature is that of the user.

20. A method according to claim 19, including the step of generating, in the computer system and using a signature key of the user, a digital signature of at least data
25 indicative of a name and/or value of at last one field related to the computer software.

21. A method according to claim 20, including the step of associating, in the computer system, the digital signature with the signature field.

22. A method according to claim 18, including the step of sending, in the computer system, data to the computer software indicative of at least the signature field.
- 5 23. A method according to claim 1 or 4, wherein the interactive element is a drawing field related to the computer software, the method including the steps of identifying, in the computer system, that the user has entered a hand-drawn picture by means of the sensing device and effecting, in the computer system, an operation associated with the drawing field.
- 10 24. A method according to claim 23, including the step of activating, in the computer system, a hyperlink.
25. A method according to claim 23 or 24, including the step of sending, in the
15 computer system, data to the computer software indicative of at least the drawing field.
26. A method according to claim 1 or 4, including the step of printing the interface surface on demand.
- 20 27. A method according to claim 26, including the step of substantially simultaneously printing the interface surface and the coded data onto a substrate.
28. A method according to claim 27, wherein the coded data is printed onto the surface to be substantially invisible to an unaided human eye.
- 25 29. A method according to claim 1 or 4, including the step of retaining a retrievable record of each interface surface printed, the interface surface being retrievable using the identity contained in its associated coded data.

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37. A method according to claim 36, wherein the substrate is laminar.

38. A method according to claim 35, wherein the tags are disposed at predetermined positions on the surface.

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39. A method according to claim 38, wherein the tags are disposed on the surface within a tessellated pattern comprising a plurality of tiles, each of the tiles containing a plurality of the tags.

10 40. A method according to claim 39, wherein the tiles interlock with each other to substantially cover the surface.

41. A method according to claim 40, wherein the tiles are all of a similar shape.

15 42. A method according to claim 41, wherein the tiles are triangular, square, rectangular or hexagonal.

43. A method according to claim 39, wherein the tags are disposed stochastically within each of the tiles.

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44. A method according to claim 35, wherein each of the tags includes at least one common feature in addition to the second identity data.

45. A method according to claim 44, wherein at least one common feature is
25 configured to assist finding and/or recognition of the tags by associated tag reading apparatus.

47. A method according to claim 46, wherein the at least one common feature is rotationally symmetric so as to be rotationally invariant.

48. A method according to claim 46, wherein the at least one common feature is ring-shaped.

10 49. A method according to claim 35, wherein each of the tags includes at least one orientation feature for enabling a rotational orientation of the tag being read to be ascertained.

50. A method according to claim 49, wherein the at least one orientation feature is
15 represented in a format incorporating redundancy of information.

51. A method according to claim 50, wherein the at least one orientation feature is rotationally asymmetric.

20 52. A method according to claim 50, wherein the at least one orientation feature is skewed along its major axis.

53. A method according to claim 35, wherein each of the tags includes at least one perspective feature for enabling a perspective distortion of the tag being read to be
25 ascertained.

54. A method according to claim 53, wherein the at least one perspective feature includes at least four sub-features which are not coincident.

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64. A method according to claim 58, wherein the tags are visible to an average
5 unaided human eye under daylight or ambient lighting conditions.

10 66. A method according to claim 35, wherein the second identity data is represented in a format incorporating redundancy of information.

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70. A method according to claim 67, wherein the printer also prints additional information onto the surface.

71. A method according to claim 70, wherein the additional information is printed
25 onto the surface using colored or monochrome inks.

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onto the surface using one of the following combinations of colored inks:

CMY;

CMYK;

CMYRGB; and

5 spot colour.

73. A method according to claim 34, wherein at least a plurality of the tags are disposed stochastically upon the surface.

10 74. A method according to claim 34, wherein the tags are disposed in a regular array on the surface.

75. A method according to claim 74, wherein the array is triangular.

15 76. A method according to claim 74, wherein the array is rectangular.

77. A method according to claim 75, wherein the tags are tiled over the surface.

20 78. A method according to claim 34 further including additional non-tag information disposed on the surface.

79. A method according to claim 1 or 4, wherein the region is identified with sufficient precision to distinguish the region from 10^{15} other regions.

25 80. A method according to claim 1 or 4, wherein any 10 millimetre diameter subregion of the region includes sufficient coded data to identify the region.

81. A method according to claim 80, wherein any 10 millimetre subregion of the region includes sufficient coded data to identify at least one point of the region.

5 82. A system for enabling user interaction with computer software running in a computer system via:

an interface surface containing information relating to the computer software and including coded data indicative of an identity of the interface surface and of at least one reference point of the interface surface; and

10 a sensing device which, when placed in an operative position relative to the interface surface, uses at least some of the coded data to sense indicating data indicative of: the identity of the interface surface; and a position of the sensing device relative to the interface surface;

the system being configured to, in the computer system:

15 (a) receive the indicating data from the sensing device;

(b) use the indicating data to identify at least one interactive element relating to the computer software; and

(c) operate the computer software in accordance with instructions associated with the at least one interactive element.

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83. A system according to claim 82, wherein the interactive element is associated with a zone of the interface surface, the system being configured to use the position of the sensing device to identify the zone and thereby the interactive element.

25 84. A system according to claim 83, wherein the sensing device generates movement data indicative of its movement relative to the interface surface using at least some of the coded data, the computer system being configured to receive the movement data, wherein (b) includes using the movement data to identify the zone and thereby the

interactive element.

85. A system according to claim 82, further including the sensing device.

5 86. A system for enabling user interaction with computer software running in a computer system, the system including:

an interface surface containing information relating to the computer software and including coded data indicative of an identity of the interface surface and of at least one reference point of the interface surface;

10 the system being configured to, in the computer system:

(a) receive indicating data from a sensing device, the indicating data being indicative of the identity of the interface surface and a position of the sensing device relative to the interface surface, wherein the sensing device, when placed in an operative position relative to the interface surface, senses the indicating data using at least some of
15 the coded data;

(b) use the indicating data to identify at least one interactive element relating to the computer software; and

(c) operate the computer software in accordance with instructions associated with the at least one interactive element.

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87. A system according to claim 86, wherein the interactive element is associated with a zone of the interface surface, the system being configured to use the position of the sensing device to identify the zone and thereby the interactive element.

25 88. A system according to claim 87, wherein the sensing device generates movement data indicative of its movement relative to the interface surface using at least some of the coded data, the computer system being configured to receive the movement data, wherein (b) includes using the movement data to identify the zone and thereby the

interactive element.

89. A system according to claim 86, further including the sensing device.

5 90. A system according to claim 82 or 86, wherein the interactive element is a hyperlink element relating to the computer software, the computer system being configured to effect an operation associated with the hyperlink element.

10 91. A system according to claim 90, wherein the computer system is configured to send, to the computer software, data indicative of the hyperlink element.

92. A system according to any one of claims 82 or 86, the computer being configured to send, to the computer software, data indicative of a name and/or value of at least one field related to the computer software.

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93. A system according to any one of claims 82 or 86, the computer being configured to send, to the computer software, data indicative of a selected object.

20 94. A system according to claim 82 or 86, wherein the interactive element is a checkbox field relating to the computer software, the computer system being configured to:

identify that the user has entered a hand-drawn mark by means of the sensing device; and effect an operation associated with the checkbox field.

25 95. A system according to claim 94, wherein the computer system is configured to associate a true value with the checkbox field.

96. A system according to 95, wherein the computer system is configured to send data to the computer software indicative of at least the checkbox field.

97. A system according to claim 84 or 86, wherein the interactive element is a text field relating to the computer software, the computer system being configured to:
5 identify that the user has entered handwritten text data by means of the sensing device; and effect an operation associated with the text field.

98. A system according to claim 97, the computer system being configured to
10 convert the handwritten text data to computer text.

99. A system according to claim 98, the computer system being configured to associate the computer text with the text field.

100. A system according to 97, the computer system being configured to send data to the computer software indicative of at least the text field.
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101. A system according to 81 or 86, wherein the interactive element is a signature field relating to the computer software, the computer system being configured to:
20 identify that the user has entered a handwritten signature by means of the sensing device; and
effect an operation associated with the signature field.

102. A system according to claim 101, the computer system being configured to
25 verify that the signature is that of the user.

103. A system according to claim 102, the computer system being configured to use

a signature key associated with the user to generate a digital signature of at least data indicative of a name and/or value of at last one field related to the computer software.

104. A system according to claim 103, the computer system being configured to
5 associate the digital signature with the signature field.

105. A system according to claim 101, the computer system being configured to send, to the computer software, data indicative of at least the signature field.

10 106. A system according to any one of claims 82 and 86, wherein the interactive element is a drawing field related to the computer software, the computer system being configured to:

identify that the user has entered a hand-drawn picture by means of the sensing device; and

15 effect an operation associated with the drawing field.

107. A system according to method of claim 106, wherein the computer system is configured to activate a hyperlink.

20 108. A system according to claim 107, the computer system being configured to send, to the computer software, data indicative of at least the drawing field.

109. A system according to claim 84 or 86, further including the sensing device, wherein the sensing device includes a marking nib.

110. A system according to claim 84 or 86, further including the sensing device, wherein the sensing device contains identifying data indicative of an identity of the user

111. A system according to claim 110, the computer system being configured to monitor the identifying data when the sensing device is in use.
- 5 112. A system according to claim 82 or 86, the computer system including a printer to print the information onto the interface surface on demand.
113. A system according to claim 112, the computer system being configured to substantially simultaneously print the information and the coded data onto the interface
10 surface.
114. A system according to claim 82 or 86, wherein the coded data is substantially invisible to an unaided human eye.
- 15 115. A system according to claim 82 or 86, the computer system being configured to retain a retrievable record of each interface surface printed, the interface surface being retrievable using the identity contained in its associated coded data.
116. A system according to claim 82 or 86, the information being sufficiently
20 detailed in relation to the computer software that a user can interact with the computer system without the need for a separate display device.
117. A system according to claim 82 or 86, the system being configured to distribute a plurality of the interface surfaces using a mixture of multicast and pointcast
25 communications protocols.
118. A system according to claim 112, wherein the printer includes a binding mechanism for binding multiple interface surfaces, defined by multiple corresponding

119. A system according to claim 82 or 86, wherein the coded data includes at least one tag, each tag being indicative of the identity of the region and the position of the tag within the region.

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25 126. A system according to claim 125, wherein the tiles are all of a similar shape.

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rectangular or hexagonal.

128. A system according to claim 124, wherein the tags are disposed stochastically within each of the tiles.

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129. A system according to claim 120, wherein each of the tags includes at least one common feature in addition to the second identity data.

10 130. A system according to claim 129, wherein the at least one common feature is configured to assist finding and/or recognition of the tags by associated tag reading apparatus.

131. A system according to claim 129, wherein the at least one common feature is represented format incorporating redundancy of information.

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132. A system according to claim 131, wherein the at least one common feature is rotationally symmetric so as to be rotationally invariant.

20 133. A system according to claim 132, wherein the at least one common feature is ring-shaped.

134. A system according to claim 119, wherein each of the tags includes at least one orientation feature for enabling a rotational orientation of the tag being read to be ascertained.

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135. A system according to claim 134, wherein the at least one orientation feature is represented in a format incorporating redundancy of information.

5 137. A system according to claim 136, wherein the at least one orientation feature is skewed along its major axis.

139. A system according to claim 138, wherein the at least one perspective feature includes at least four sub-features, the relative positions of which define a non-degenerate quadrilateral.

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140. A system according to claim 120, wherein each tag includes a plurality of tag elements, the first and second identity data each being defined by a plurality of the elements.

20 141. A system according to claim 140, wherein the tag elements are disposed in one or more arcuate bands around a central region of each tag.

142. A system according to claim 141, wherein there are a plurality of the arcuate bands disposed concentrically with respect to each other.

143. A system according to claim 123, wherein each element takes the form of a dot having a plurality of possible values.

145. A system according to claim 143, wherein when representing one of the possible values, the tag elements absorb, reflect or fluoresce electromagnetic radiation of a predetermined wavelength or range of wavelengths to a predetermined greater or lesser extent than the surface.

147. A system according to claim 143, wherein the tags are not substantially visible to an average unaided human eye under daylight or ambient lighting conditions.

149. A system according to claim 143, wherein the tags are visible to an average unaided human eye under daylight or ambient lighting conditions.

151. A system according to claim 120, wherein the second identity data is
25 represented in a format incorporating redundancy of information.

152. A system according to claim 119, wherein the tags are printed onto the surface by means of a printer.

153. A system according to claim 152, wherein the printer is an ink printer.
154. A system according to claim 153, wherein the tags are printed using ink that is
5 absorbent or reflective in the ultraviolet spectrum or the infrared spectrum.
155. A system according to claim 152, wherein the printer also prints additional information onto the surface.
- 10 156. A system according to claim 155, wherein the additional information is printed onto the surface using colored or monochrome inks.
157. A system according to claim 156, wherein the additional information is printed onto the surface using one of the following combinations of colored inks:
- 15 CMY;
CMYK;
CMYRGB; and
spot colour.
- 20 158. A system according to claim 119, wherein at least a plurality of the tags are disposed stochastically upon the surface.
159. A system according to claim 158, wherein the tags are disposed in a regular array on the surface.
- 25 160. A system according to claim 159, wherein the array is triangular.

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176. A method according to claim 174, wherein the sensing device also determines the offset position from a relationship between the sensing device and the field of view.